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4. (Twice Amended) A wire for a liquid crystal display, comprising:
a wire layer made of either molybdenum or molybdenum alloy; and
a supplementary layer located either on or under said entire wire layer and made of either
molybdenum nitride or molybdenum alloy nitride.

REMARKS

In response to the Office Action dated May 28, 2002, claim 4 has been amended. Claims 4, 5, 14-17 and 21 are active in this application, of which claims 4 and 14 are independent.

Based on the above Amendments and following Remarks, Applicants respectfully request that the Examiner reconsider the outstanding rejections and they be withdrawn.

Rejections Under 35 U.S.C. §103

In the Office Action, claims 4, 5, 14-17 and 21 have been rejected under 35 U.S.C. §103(a) for being unpatentable over Japanese Patent Publication No. 8-254680 to Kubo, *et al.* ("Kubo") in view of U. S. Patent No. 6,219,125 issued to Ishikura, *et al.* ("Ishikura"). This rejection is respectfully traversed.

Independent claim 4 recites "A wire for a liquid crystal display, comprising: a wire layer made of either *molybdenum or molybdenum alloy*; and a supplementary layer located either on or under said entire wire layer and made of either *molybdenum nitride or molybdenum alloy nitride*".

In this regard, the primary reference to Kubo teaches signal lines and scanning lines Yn-1, as shown in Figs. 2 and 3. The scanning lines Yn-1 include "the first metallic layers 111 consisting of the pure aluminum (Al), the second metallic layers 113 consisting of molybdenum

(Mo) arranged on the upper layer of the metallic layer 111 and the alloy layers 115 consisting of Mo-tungsten (W) alloy covering the metallic layers 111, 113” (Abstract).

In the Office Action, the Examiner asserted that the second metallic layer 113 consisting of Mo and the alloy layers 115 consisting of a Mo-W alloy correspond to the claimed wire layer and supplementary layer, respectively. This assertion is respectfully disagreed with.

According to claim 4, the supplementary layer is “made of either molybdenum *nitride* or molybdenum alloy *nitride*”. In this regard, the alloy layer 115 of Kubo is “consisting of a Mo-W alloy”, not molybdenum *nitride* or molybdenum alloy *nitride*. Thus, Kubo fails to teach the claimed feature of the supplementary layer “made of either molybdenum *nitride* or molybdenum alloy *nitride*”.

The secondary reference to Ishikura is directed to an electrode plate including a plurality of first electrodes disposed on a light-transmissive substrate and a plurality of second electrodes disposed on the first electrodes.

In Fig. 2 of Ishikura, the first metal electrode 3 comprises a principal electroconductive layer 12 and an adhesive layer 11 formed under the first metal electrode 3. The principal electroconductive layer 12 comprises “a layer of copper (Cu) or a layer of copper and nitrogen (i.e., copper nitride)” (column 3, lines 63-65). The adhesive layer 11 “may preferably comprise a material of a metal or alloy selected from the group consisting of ... Mo ...” (column 3, lines 55-58). Fig. 3 of Ishikura shows a protective layer 13 that is formed on the principal electroconductive layer 12 and “may preferably comprise a material of a metal or alloy selected from the group consisting of ... Mo ...” (column 4, lines 10-12).

Thus, although Ishikura may teach an adhesive or protective layer of Mo or Mo alloy formed on or under the principal electroconductive layer of *copper nitride*, Ishikura fails to teach

forming a supplementary layer of molybdenum *nitride* or molybdenum alloy *nitride* on or under a wire layer of Mo or a Mo alloy.

In fact, according to Ishikura, the Mo or Mo alloy layers 11 and 13 are the *supplementary* layers that can be formed on or under the copper nitride layer 12 while the Mo or Mo alloy layer of the present invention is a wire layer, not a supplementary layer. Also, Ishikura teaches the copper nitride layer as the principal electrode conductive layer 12, but fails to teach the claimed supplementary layer made of either molybdenum *nitride* or molybdenum alloy *nitride*. Thus, none of the applied prior art references teaches the claimed feature of the supplementary layer “made of either molybdenum *nitride* or molybdenum alloy *nitride*”, and therefore it would not have been obvious to combine the teachings of the applied references to arrive at the claimed invention.

As a separate issue, it appears that the Examiner is taking the position that, in Kubo, locating the alloy layers 115 either on or under the entire wire is “at least obvious” in order “to increase the thickness of the metal wire, so as to improve the corrosion resistance, so that decreasing the wire disconnection” (Page 2, lines 17-19). Applicants respectfully traverse this position.

As shown in Figs. 4(a) to 4(d) of Kubo, the alloy layer 115 is deliberately formed to cover the first and second metallic layers 111, 113. There is no indication from Kubo that the alloy layer 115 can be formed between the first and second metallic layers 111, 113. If the alloy layer 115 is formed under the second metallic layer 113 as the Examiner asserted, the second metallic layer 113 would be *exposed, not protected* and this would degrade the corrosion resistance and increase the wire disconnection. Thus, it is respectfully submitted that it is would

not have been obvious to modify the teachings of Kubo such that the second metallic layer 113 is formed on the alloy layer 115.

Accordingly, Applicants respectfully submit that claim 4 is patentable over Kubo and Ishikura, and claim 5 that is dependent from claim 4 would be patentable at least for the same reason.

Independent claim 14 recites “A liquid crystal display, comprising: ... a data wire made of one of either molybdenum or molybdenum alloy and formed on the gate insulating layer; *a supplementary data wire located either on or under the entire data wire and made of either molybdenum nitride or molybdenum alloy nitride* ...”. As previously mentioned, none of the applied references teaches or suggests the claimed feature of the supplementary data layer “made of either molybdenum *nitride or molybdenum alloy nitride*”.

Also, as shown in Fig. 2 of Kubo, the scanning lines Yn-1 is formed under a gate insulating layer 121. Ishikura also fails to show the metal electrode 3 formed on a gate insulation layer. Thus, none of the applied references teaches or suggest the claimed feature of the “data wire ... formed on the gate insulating layer”.

For these reasons, Applicants respectfully submit that independent claim 14 is patentable over Kubo and Ishikura. Likewise, claims 15-17 and 21 that are dependent from claim 14 would be also patentable at least for the same reason.

Accordingly, Applicants respectfully request that all the rejections and objections over claims 4, 5, 14-17 and 21 be withdrawn.

CONCLUSION

All of the stated grounds of objection and rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding objections and rejections and that they be withdrawn. Applicants believe that a full and complete response has been made to the outstanding Office Action and, as such, claims 4, 5, 14-17 and 21 are in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

Prompt and favorable consideration of this Amendment is respectfully requested.

Respectfully submitted,



Hae-Chan Park
Reg. No. 50,114

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McGuire Woods LLP
1750 Tysons Boulevard
Suite 1800
McLean, VA 22102-4215
Tel: 703-712-5000
Fax: 703-712-5050
HCP:WSC/tmk

APPENDIX

The “marked-up” version of the amended claim is as follows:

4. (Twice Amended) A wire for a liquid crystal display, comprising:
a wire layer made of either molybdenum or molybdenum alloy; and
a supplementary layer located either on or under said entire wire layer and made of either
molybdenum nitride or molybdenum alloy nitride.